2017 National Geospatial Data Asset (NGDA) Dataset Report
Moderate Resolution Imaging Spectroradiometer (MODIS) - Terra

Introduction:

This report aggregates information related to the National Geospatial Data Asset (NGDA) in the title above. In order to be designated an NGDA, the dataset must meet the criteria outlined in the Office of Management and Budget OMB Circular A-16 Supplemental Guidance. The guidance also directs Federal agencies to implement and use a portfolio management approach to ensure NGDA Datasets are managed by officially designated agencies, on behalf of all users, as national capital assets. As part of this process, the NGDA Dataset Managers regularly assess the maturity of their NGDA Datasets based on the geospatial data lifecycle and agency business requirements. All NGDA Datasets are assessed uniformly using a set of benchmark questions and a maturity index. This report includes results from the 2017 Lifecycle Maturity Assessment (LMA) which will be used to inform NGDA Dataset Managers about priorities and will be aggregated into a Theme Summary Report for NGDA Theme Leads.

NGDA Dataset Details:

Official Title: Moderate Resolution Imaging Spectroradiometer (MODIS) - Terra

Metadata Record Title*: Moderate Resolution Imaging Spectroradiometer (MODIS) - Terra

Theme: Imagery

Dataset Lead Agency: U.S. National Aeronautics and Space Administration,

Theme Executive Champion(s):

Name:	Thomas (Tod) Dabolt	Everett Hinkley
Agency:	U.S. Department of Interior	U.S. Department of Agriculture
Email:	thomas_dabolt@ios.doi.gov	ehinkley@fs.fed.us

Theme Lead(s):

Name:	John Cullen	Shirley Hall
Agency:	U.S. Geological Survey	U.S. Department of Agriculture
Email:	jcullen@usgs.gov	shirley.hall@wdc.usda.gov

Dataset Manager(s):

Name:	Chris Doescher	Andrew Mitchell
Agency:	U.S. National Aeronautics and Space Administration	U.S. National Aeronautics and Space Administration
Email:	cdoesch@usgs.gov	andrew.e.mitchell@nasa.gov

---

* If the metadata has been updated and re-harvested after publication of this report, the link may no longer be valid. The NGDA Dataset may be searched for manually in Data.gov or GeoPlatform.gov using the metadata record title.

2017 Lifecycle Maturity Assessment (LMA)

Reporting on the status of each NGDA Dataset is an OMB requirement, and assessing the developmental maturity of the NGDA provides managers the ability to support NGDA Datasets in a more universal and transparent manner. The LMA is based on the OMB Circular A-16 seven stages of the geospatial data lifecycle with associated benchmark activities for each stage. Each benchmark has a range of activities, from no activity to significant activity, which provide the interpretation of maturity for that benchmark. The cumulative level of activity determines the maturity of the each NGDA Dataset and is based on a Maturity Matrix and How to Calculate Maturity. Additional information can be found at the GeoPlatform.gov 2017 Lifecycle Maturity Assessment (LMA) community web page.

2017 LMA Questions and Responses

The 2017 LMA includes a series of questions about the benchmark activities within each lifecycle stage, an explanation of specific actions that might be used to accomplish the benchmark activity (clarifying statements), and a series of status metrics in the form of response options. The NGDA Dataset Manager selects the response option that most accurately describes the current maturity level for the NGDA they manage. The responses to all the questions, and their associated metrics, collectively determine the overall maturity of an individual NGDA. The 2017 LMA consists of 3 general questions and 20 maturity questions. An additional 12 questions justify response choices to the 20 maturity questions. The questions are organized across the seven stages of the geospatial data lifecycle or pertain to all lifecycle stages. The detailed 2017 LMA questions can be found in the National Geospatial Dataset Asset 2017 Lifecycle Maturity Assessment document.

General Questions for All Stages

0) Part 1: Is this dataset considered "active" or "static"?
Response: The dataset is considered active - the dataset is being actively updated and maintained and has active components in some or all of the 7 Lifecycle Stages (with the exception of the Archival Stage)

0) Part 2: For the 2017 LMA, please provide what time frame the assessment includes?
Response: For an NGDA that completed the baseline assessment, responses include dataset activities from 2015 to 2017

0) Part 3: Do you have a process to evaluate the dataset to determine if it continues to meet the criteria established for a National Geospatial Data Asset (NGDA)?
Response: Yes

1) Is there a recurring process to obtain funding for all lifecycle stages of this dataset?
Response: Funding support is part of agency budget on a recurring basis, funding is consistent and tied to business requirements, and supports all lifecycle stages

1.a) To justify your response to Question 1, what is the primary funding source for your NGDA?
Response: Federal agency - General lead agency budgetary funding for a specific program that supports this NGDA or the NGDA itself

1.b) To further justify your response to Question 1, do you have secondary source(s) of funding?
Response: No

2) Is there a process in place to ensure that open government and transparency guidelines are followed in all lifecycle stages for this dataset?
Response: Fully implemented including recurring assessments

3) Are there processes and tools in place so that staff are sufficiently knowledgeable to ensure the continuity of the dataset for all stages of the lifecycle, especially during staffing transition?
Response: Fully implemented including recurring assessments

STAGE 1 - Define/Plan
Characterization of data requirements based upon business-driven user needs.

4) Are business requirements defined and formalized?
Response: Fully implemented including recurring assessments

5) Are there processes in place to ensure partners and stakeholders are involved in requirements collection?
Response: Fully implemented including recurring assessments

5.a) To justify your response to Question 5, which external partners and stakeholders are involved in the requirements collection process?
Federal agency - Partners and stakeholders are participants from other federal agencies
International - Partners and stakeholders are participants from international governments or organizations
Academia - Partners and stakeholders are participants from academic institutions
Other - The datasets derived from the ASTER and MODIS instruments have been in production since the launch of the EOS Terra satellite in 1999. The requirements for the "standard products" from those instruments were established in the mid-1990's through a scientific review process. The scientific quality assurance, calibration and validation are all part of the instrument science program managed by NASA. The data system requirements to process, reprocess (as required), archive and distribute the datasets were also established as a part of mission definition and planning. One of the key requirements on the data system was to accommodate growth and evolution. An example of growth is to be able to reprocess data from the beginning of the mission to the present date (many years) within a few months. The user community is diverse, large and global. There are two key processes to assess the user community needs and make improvements in the data system to serve the ASTER and MODIS users. The first is a set of User Working Groups (UWG) at each of the Distributed Active Archive Centers (DAACs), which periodically review the DAAC data holdings and services offered and make recommendations for improvement. The second is an annual user survey to derive the "American Consumer Satisfaction Index (ACSI)", which also asks users to provide free-form comments on desired improvements. Both these processes have been in place for over a decade. The key stakeholders are NASA Headquarters (funding organization), the ESDIS Project (responsible for implementation and management), DAACs (stewards of datasets) and user community (users of datasets). Processes are in place for engaging all of these stakeholders. The PPBE process that funds the ESDIS Project and revisits budget requirement annually as well as weekly and monthly reporting by the ESDIS Project keeps NASA HQ involved. The annual work plans, ESDIS-DAAC weekly teleconferences and one or two meetings each year keeps the DAACs involved in the process. User Working Groups and annual user surveys provide user inputs to requirements.

6) Is there a quality assurance process for the dataset?
Response: Fully implemented including recurring assessments

6.a) To justify your response to Question 6, what methods are used to develop and complete quality assurance assessments?

Internal quality assurance assessment - A defined review process is undertaken by agency personnel through quality evaluation, testing, or other manual or automated methods

Other - NASA follows the information quality guidelines published at http://www.nasa.gov/pdf/517756main_FINAL_NASA_guidelines.pdf. In addition, in managing the scientific digital data products such as the ASTER and MODIS datasets, NASA ensures that the data are well-calibrated, validated and documented so that users are aware of the data quality prior to using the data. The data are released promptly according the Earth Science Data and Information Policy (http://science.nasa.gov/earth-science/earth-science-data/data-information-policy/), but with clear indication of the maturity levels (http://science.nasa.gov/earth-science/earth-science-data/data-maturity-levels/) so that the users become aware of the merits and limitations of the datasets before using them.

7) Has an assessment been done to evaluate the sensitivity, privacy, and confidentiality of this dataset?
Response: Fully implemented including recurring assessments

8) Are defined data standards used in collecting, processing, and/or rendering the data?
Response: Fully implemented including recurring assessments

8.a) To justify your response to Question 8, what types of data standards are used in collection, processing, and/or rendering the data?

Standards not endorsed by FGDC in use: The requirements (such as accuracy, timeliness, collection methods) pertaining to collection of science data from ASTER and MODIS on board the NASA satellites are well documented. For example, see http://modis.gsfc.nasa.gov/about/specifications.php and http://asterweb.jpl.nasa.gov/content/03_data/04_Documents/aster_user_guide_v2.pdf. The data formats and metadata used for the digital products derived from the instrument observations follow community standards approved by NASA Headquarters (see https://earthdata.nasa.gov/user-resources/standards-and-references#ed-standards).

STAGE 2 - Inventory/Evaluate
The creation and publication of a detailed list of data assets and data gaps (both internal and external) as they relate to business-driven user need.

9) Is an assessment done to determine if data necessary to meet requirements already exists from other sources (either within or outside the agency) before collecting or acquiring new data?
Response: Fully implemented including recurring assessments

9.a) To justify your response to Question 9, what actions are performed to determine if data already exists from other sources?

Other - This question does not really apply to datasets from ASTER and MODIS instruments on board NASA satellites more than 10 years old. When the Earth Observing System (EOS) Program was approved in 1990 and instrument complements were selected for flight on the EOS spacecraft a significant number of community based reviews and restructuring, rescoping, rebaselining, and reshaping occurred with a thorough analysis of scientific requirements and which instrument complement could best meet the requirements, considering international collaborations where needed and appropriate. As long as the instruments continue to operate the datasets will continue to be produced, archived and distributed to users. While the instruments and spacecraft get older and approach their end of life, one needs to plan for

replacements to meet the scientific requirements for long-term time series. NASA has worked in collaboration with NOAA on the Suomi National Polar Partnership (SNPP) spacecraft on which the instrument VIIRS is taking measurements similar to those from MODIS.

STAGE 3 - Obtain
The collection, purchase, conversion, transformation, sharing, exchanging, or creation of geospatial data that were selected to meet the business needs is identified.

10) Is there a process for obtaining data for this dataset?
Response: Fully implemented including recurring assessments

10.a) To justify your response to Question 10, what actions are performed to obtain data?
Obtain data by creating and/or collecting the data
Other - The ASTER and MODIS datasets consist of the measurements from the ASTER and MODIS instruments on NASA's EOS spacecraft, as well as standard digital scientific products derived from those measurements. The data collection began in 1999 from the EOS Terra spacecraft which carries ASTER and one of two MODIS instruments, and in 2002 from the EOS Aqua spacecraft which carries the other MODIS instrument. Thus the data collection process has been in place for more than a decade, and will continue as long as the instruments and spacecraft are functioning. Once every two years, NASA Headquarters conducts a "Senior Review", a review by an external scientific committee, of all missions that have exceeded their original design life and uses the results of the review to decide whether to extend the collection of data or terminate the missions.

11) Is the metadata in an FGDC-endorsed geospatial metadata standard, follows the NGDA Metadata Guidelines, and is published?
Response: Published and fully implemented NGDA Metadata Guidelines including recurring assessment of the metadata

12) Part 1: Is there a business process in place to determine the geographic coverage of the dataset and establish milestones to track progress towards completion?
Response: Fully implemented including recurring assessments

12) Part 2: Based on the business requirements, what is the estimated completeness of the geographic coverage?
Response: Geographic coverage is fully complete (100%) based on business requirements

12.a) To justify your response to Question 12 Part 2, what is the geographic coverage of the dataset as defined by the business requirements?
Response: Global coverage (all) - Geographic coverage includes the entire surface of the earth at the applicable resolution(s)

STAGE 4 - Access
Making data produced known and retrievable to the community through documentation and discovery mechanisms so the users can meet their business requirements.

13) Do you provide users access to the data in a digital machine-readable format?
Response: Fully implemented including recurring assessments

13.a) To justify your response to Question 13, what types of digital machine-readable formatted web services or data download services are available for this dataset?
HDF - Hierarchical Data Format

STAGE 5 - Maintain
The ongoing processes and procedures to ensure that the data meet business requirements.

14) Is there a maintenance process in place for this dataset?
Response: Fully implemented including recurring assessments

15) Is there a quality assurance/quality control (QA/QC) process as part of this dataset's maintenance?
Response: Fully implemented including recurring assessments

STAGE 6 - Use/Evaluate
The ongoing assessment, validation, and potential enhancement of data to meet user needs and business requirements.

16) Is there a process to determine if the dataset meets user needs?
Response: Fully implemented including recurring assessments

17) Is there a process to provide users information on how to evaluate and properly use the dataset?
Response: Fully implemented including recurring assessments

18) Do the business processes and management practices include an assessment of changing technology?
Response: Fully implemented including recurring assessments

STAGE 7 - Archive
Facilitate the selection/appraisal retention, storage, preservation and accessibility of geospatial content with long-term value (or the disposition of material as appropriate) and establish mechanisms for the coordinated development of stewardship tools and services across all impacted Federal agencies.

19) Is there an archiving appraisal process for the dataset?
Response: Fully implemented including recurring assessments

19.a) To justify your response to Question 19, where is digital data being archived as determined by your appraisal process outcome?
Stored locally
Other - NASA is not legislatively mandated to preserve data permanently as other agencies such as the USGS, NOAA and NARA are, it is essential for NASA to preserve all the data and associated content beyond the lives of NASA's missions to meet NASA's near-term objective of providing access to data and services for active scientific research. Also NASA has to ensure that the data and associated content are preserved for transition to permanent archival agencies. NASA is well positioned to meet its requirements to archive the data for active scientific research and to preserve data and associated content for transition for permanent archival. NASA has developed an Earth Science Preservation Content Specification document (see https://earthdata.nasa.gov/standards/preservation-content-spec) which is being applied as a requirement for new missions and a checklist to gather all relevant content from its currently operating and

older missions. The ASTER and MODIS land products will be transitioned to the USGS for permanent archival.

19.b) To justify your response to Question 19, where is printed data being archived as determined by your appraisal process outcome?

No printed data is available to archive for this dataset

LMA Submission and Reviewer Information

LMA Submission:
    Status: Complete
    Date: 7/31/2017

Submitted by:
    Name: Treva Houska
    Email: treva.houska.ctr@usgs.gov

Reviewed by:
    Name: Carolyn Gacke
    Email: carolyn.gacke.ctr@usgs.gov
    Date: 31-Jul-17

LMA Maturity Overview

Each of the 20 maturity question responses was assigned a maturity level based on a Maturity Matrix. The maximum level of maturity (Optimized; Established) is level (5) and the least level of maturity (No Activity) is level (0). The question response maturity was then averaged across each lifecycle stage to determine the stage maturity as described in How to Calculate Maturity. The table below shows the numerical maturity levels with their corresponding descriptions and characteristics.

Maturity	Maturity Characteristics for All Lifecycle Stages
Optimized; Established Level = 5	Dataset meets virtually all business needs of all users. The dataset is considered authoritative by owners and secondary users. It is curated across all stages of the approved lifecycle. Future needs are defined for both the primary owner and secondary users on a regular basis and resources for addressing both current and future business requirements are available.
Mature; Consistent Level = 4	Dataset meets all the business needs of the primary owner and most of the secondary users. The dataset is curated and used as an authoritative resource by the primary owner and secondary users. Future needs are being identified and steps are planned to address these. All stages are supported and reviewed on a recurring basis. The dataset is well managed in relation to the approved lifecycle.
Managed; Predictable Level = 3	Dataset meets a significant number of the business needs of the primary owner and is widely used by secondary users. Benchmark activities are occurring in at least four of the approved lifecycle stages. Management practices in relation to the approved lifecycle is moderate but consistent. Dataset is integrating changing business requirements in lifecycle stages impacting overall maturity.
Transition; Transformation Level = 2	Dataset meets business needs of the primary owner and has moderate use by secondary users. Benchmark activities are occurring in at least three stages. Efforts to integrate funding, include partners, and obtain data are not supported in a sustained manner. Management practices in relation to the stages of the approved lifecycle is limited.
Planned; Initial Development Level = 1	Dataset in initial planning or limited in meeting business needs of the primary owner. Benchmark activities in the approved lifecycle are just starting to consider secondary uses, Partners/stakeholders involvement is being defined and developed to support additional dataset uses. Dataset development is in a very early stage. Minimal or limited management against the benchmarks in the approved lifecycle.
No Activity Level = 0	Dataset not developed or meets project/local business needs of the primary owner. Secondary, additional uses, or partners/stakeholders were not considered. Dataset is not recognized as authoritative data or is part of a similar dataset. Not managed to any of the benchmarks in the approved lifecycle.

Table 1: 2017 Maturity Matrix.

2017 NGDA Dataset Maturity Results

Based on the maturity question responses, an overall maturity level was calculated for this NGDA, along with maturity calculations for the general questions for all stages and each discrete lifecycle stage as shown in Table 2 below.

Maturity Categories	Maturity Level
Overall NGDA Maturity	**5 - OPTIMIZED; ESTABLISHED**
General Questions for All Stages	5 - Optimized; Established
Stage 1: Plan/Define	5 - Optimized; Established
Stage 2: Inventory/Evaluate	5 - Optimized; Established
Stage 3: Obtain	5 - Optimized; Established
Stage 4: Access	5 - Optimized; Established
Stage 5: Maintain	5 - Optimized; Established
Stage 6: Use/Evaluate	5 - Optimized; Established
Stage 7: Archive	5 - Optimized; Established

Table 2: 2017 Maturity Results.

LMA Process Changes Between 2015 and 2017

In 2015, a baseline assessment of National Geospatial Data Assets (NGDA) was performed for each of the NGDA Datasets in the federal geospatial portfolio. Information related to the 2015 baseline LMA can be found at 2015 NGDA Lifecycle Maturity Assessment, which also includes a link to the 2015 Reports. A follow up analysis of the 2015 LMA baseline process and its results identified ways to improve the LMA workflow, increase efficiency as well as decrease reporting burden. Several recommendations were identified and implemented in 2017, which included improvements to normalize the responses in 2017. A secondary effect of improvements to normalization is that results from 2017 and 2015 are not directly comparable. These changes, and their impacts, are detailed in the webpage: Temporal Changes in Lifecycle Maturity Assessment (LMA) Maturity and Results Comparisons.